

^{1*}Kobra Rahbari²Nader Naghshineh

Carpets Metadata: Identifying and Defining the Information Items Necessary to Describe the Carpets



Abstract: - Carpets represent important cultural, historical, and artistic artworks in human societies. To preserve and organize carpets in various private and public collections (including specialized libraries), these artworks must be described in a way that is both special and unique. To describe these artworks, a comprehensive metadata schema is needed, which is currently not available. The research goal is to identify the necessary items to introduce and describe carpets in a metadata schema. The present study is applied in terms of purpose and uses a mixed approach that includes existing metadata schema literature and qualitative deep interviews. A combination of existing metadata standards, such as Dublin Core, VRA Core, and other standards related to textiles and decorative arts, can be used to define carpet metadata. The qualitative part will include interviews with a diverse group of stakeholders including carpet vendors and sellers, information experts, and collectors. The findings of the study showed that out of a total of 209 elements, based on the metadata standard of the studied carpet, 149 elements are used in the description of the carpet in the form of eleven subgroups and two main groups. The results of this study include the identification of key elements and organization in the form of a checklist that can be used as a guide for researchers and experts in the field of carpets. This checklist will help facilitate the collection and analysis of information in future studies and will contribute to the development of metadata standards in this field.

Keywords: Carpets, Metadata Standard, Dublin Core, VRA Core

I. INTRODUCTION

The Persian carpet is one of the main and unique characteristics of Iranian culture and art. This art and craft have had a special place in the lives of the Iranian people since ancient times and continues to do so (Shabani, 2024). Persian carpets are not just consumer goods, but works of art, each with its own story and identity. Exquisite carpets are true treasures, and the Persian carpet is recognized and admired worldwide as one of the cultural symbols of Iran. These carpets are exhibited in various exhibitions and museums around the world and are considered one of the best examples of oriental art (Hajivandi, 2023). With a rich and cultural history, beautiful and diverse patterns, a vital role in everyday life, and a special place in world art, the Iranian carpet is known as one of the most important symbols of Iranian culture and art. The importance of carpets in Iranian culture cannot be ignored, and this art continues to be in the hearts and souls of the Iranian people (Salehi & Shairi, 2023). Carpets are a staple in any decor. Having a carpet has many benefits, and it's not just about beautifying a space. Not only can a carpet change the look and feel of a room, but it also has other benefits, from warming the space to reducing noise. A carpet with a bold design can become a focal point for a room's decor. The right carpet ties all the elements of a room together (Mirzaee et al., 2021). Historical evidence indicates that the origin and place of the first carpets are traced back to Asia and especially Iran, Turkmenistan, and the Caucasus. Therefore, these countries are known as the cradle and birthplace of the art of carpet weaving in the world. Evidence indicates that the art of carpet weaving and textile dates back to ancient times, even before the birth of Christ. In the poetry of poets and epic poets of the seventh century BC, there are signs of the existence of carpets. Iranian products are more diverse than carpets produced in other countries' carpets. This diversity is evident in color, pattern, fiber type, comb and density, dimensions and size, application, and quality. For example, Iran is the only country that produces different combs and densities and is the only country that has been able to achieve the technology of producing 1500 comb carpets. Traditional and authentic Iranian designs include patterns that have a unique place among customers in European countries (Yavari, 2023). The art and special elegance used in the designs, the use of vivid, natural, and diverse colors next to each other that not only do not conflict with each other but are also

^{1*} PhD Candidate, Kish International Campus, University of Tehran, Iran. Email: c.rahbari@ut.ac.ir

² Associate Professor, Department of Information Science and Knowledge Management, College of Management, University of Tehran, Tehran, Iran. Email nnaghsh@ut.ac.ir

* Corresponding author Email: c.rahbari@ut.ac.ir

well matched with each other, the attractive and meaningful patterns that remind us of the history, culture, and authenticity of Iran, all together attract the viewer. The popularity of Iranian carpets is due to all the features that have existed throughout history and all have been effective in the reputation of Iranian carpets, so today, Iranian carpets have gained their special fame and popularity in global markets (Hajivandi, 2023).

So, in general, recognizing the artistic features, value and semantic characteristics of the art and craft of handmade carpets is essential, and Iranian handmade carpets can be examined and evaluated from various cultural, artistic, social, and economic aspects. This is while there is no specific plan for introducing carpets. The exchange, transfer, and accessibility of information at both national and international levels necessitate the effective organization and integration of data. Without a proper and optimal structure for managing information, achieving comprehensive and accurate retrieval becomes unattainable. Metadata is, in fact, structured information that describes and locates or provides other methods to facilitate the retrieval, use, or management. Using a descriptive-analytical method as well as utilizing various sources, documents, and interviews, the present investigation tries to answer the following: Which of the elements in metadata standards is suitable for organizing and documenting carpets?

Literature Review and Research Background

Persian Carpet

The Persian carpet is a complete reflection of Iranian culture, authenticity, and art. This authentic art has been kept alive through the ages by the skill of weavers and by Iranian culture (Mirzaee et al., 2021). The Iranian carpet is a symbol of art, ingenuity, culture, and authenticity. Iranians have been pioneers in carpet weaving, and over time, with meticulous attention to detail, creativity, and taste, they have brought this art to a level of perfection that can be considered a representative of Iranian culture and art (Salehi & Shairi, 2023). The point here is that this art, in addition to its originality and antiquity, is increasingly popular among different nations and cultures. The beauty of the design and pattern is one of the main factors in the permanence of this art, and Iranian artists have turned the Iranian carpet into a unique work by observing aesthetic points in the text and border of the carpet (Hajivandi, 2023). Iranians have always shown interest in using handmade carpets in their homes and have tried to add more beauty and warmth to their homes by using this unique art and trying to preserve this valuable treasure (Shabani, 2024). One of the fundamental methods for preserving this valuable heritage is to describe and document this precious phenomenon using metadata.

Metadata

The purpose of each metadata standard is usually focused on a specific type of metadata. For example:

- Descriptive metadata: to identify and describe resources.
- Structural metadata: to indicate how resources are organized.
- Management metadata: to manage and maintain resources.

The scope of metadata standards also refers to the types of materials that can be covered. These scopes would include:

- Books and articles: standards such as MARC and Dublin Core.
- Images and media: standards such as IPTC and EXIF.
- Scientific data: standards such as Data Cite and Schema.org.

Accordingly, the community that uses metadata standards includes various groups:

- Libraries and archives: who are looking for standards to manage their resources.
- Educational institutions: who need metadata to manage educational content.
- Software developers: who are looking to implement metadata standards in their software.

In the digital world, a wide range of digital information such as film, image, audio, and text have emerged in various formats and platforms with different purposes and applications. In this regard, the custodians and

producers, as well as the designers of databases and information systems, are trying to provide the required information to the information society in a suitable form and format for optimal use. Processors and service providers of information resources aim to organize the content of resources in a way that makes them available to their audiences effectively. To this end, various metadata models have emerged that differ in terms of the type of descriptive data, level of description, and type of resources. There is no single metadata model for all types of digital resources to meet all the specialized characteristics of resources. However, the MARC metadata model, the Dublin Core metadata model, and the Metadata Object Description Model (MODS) can be used generically, and the Public Radio Metadata for media (PB Core) and the Visual Resource Association Core (VRA Core) for visual works of art can be used. One of the best metadata models for describing and documenting carpets is the Dublin Core metadata model. This metadata format is more widely accepted as a global standard. The project takes its name from a workshop of the same name held in 1995 by the Online Computer Library Center (OCLC) in Dublin, Ohio, USA. The Dublin Core metadata elements consist of 15 metadata elements to describe resources. These elements are: title, creator, subject, description, publisher, collaborator, date, type, format, identifier, source, language, relationship, coverage, and rights (Asadi et al., 2016). In other words, the rapid changes in the ways of accessing information brought about by the emergence of the World Wide Web have disrupted the ways of describing and managing information resources. Metadata is a key tool in this work and is an important link in the value chain of knowledge economies. However, there are many uncertainties about how metadata should be deployed in information systems. How can it be used in documenting Iranian carpets? Can different metadata standards be used in describing Iranian carpets? All of these issues have motivated me to write this article.

Table 1 presents the most important research conducted in this field.

Table 1: Studies conducted on the impact of the metadata model on object description and documentation

Researcher and year	Research title	Findings
White et al. (2024)	13 Creating a metadata schema for reservoirs of data: a system engineering approach	Physical modeling methods, with intermediate data, are being developed to generate large-scale synthetic images for machine learning (ML) algorithms with automatic target recognition (ATR). This study aims to develop a systematic approach to store and retrieve this information using high-performance computing resources. Metadata tags focused on location, time, and other factors are used for searching. Where possible, metadata generation is performed automatically based on the content of the data file. Furthermore, we have described the architecture of the proposed system. This data storage and retrieval system uses a large collection of collected images to provide local-specific data for ATR ML datasets.
Weller et al. (2024)	The Future is Meta: Metadata, Formats and Perspectives towards Interactive and Personalized AV Content	Media content production has undergone dramatic changes in recent years. Multiple daily updates are as common for some platforms as the content provided is processed specifically for their target audience. Such features are made possible by metadata, which categorizes information and makes it accessible. In conjunction with AI-powered tools, metadata is shaping the future of audio and video content production, distribution, and consumption. It allows editors to search archives efficiently, as in the Dedicated Media Project, and broadcasters to offer content that matches the user's surroundings, as some projects allow users to experience audio and video content from different perspectives. In this paper, we will discuss the requirements and potential approaches, and provide an overview of possible application areas and use cases.

Karimi et al. (2024)	Designing a Metadata Application Profile to Describe and Organize the Content Objects	This research aimed to design a metadata application profile for describing and organizing (processing) content objects of the library, museum, and archive of the holy shrine in Iran. The data collection method was structural observation and its tools were interviews, questionnaires, and checklists. The findings showed that to describe and organize (process) content objects of the library, museum, and archive of the holy shrine, three separate metadata application profiles are needed for the library, museum, and archive.
Pandey and Kumar (2023)	A Survey of the Metadata Element Sets Used for Digital Art Objects in the Online Collections of the Museums of India	Using online content analysis and observation, this study examines how metadata elements are used to describe different art collections in five national museums in India. The study shows that 13 categories of art objects are accessible by all museums. Each category is described by a different number of metadata input elements. The study also identifies the metadata elements those different museums prefer for different types of art objects, as well as common elements, showing how metadata is crucial in facilitating access to cultural objects. The results can help to develop metadata guidelines and strategies for digital collections, making digital art objects more discoverable and accessible.
Moosavi et al. (2023)	Investigating the importance of the EBUcore metadata set for organizing audiovisual contents and resources	As a museum object, carpets contain valuable information that can be used in a variety of artistic, historical, and cultural studies. This study examines museum metadata standards and related texts, including carpet identification cards in museums and other available sources. Based on the research findings, 353 elements were placed in 30 subgroups and two main descriptive and managerial groups, and three descriptive levels were presented for organizing and documenting museum carpet information by implementing two Delphi stages. According to the results, a model for organizing carpets in museums is presented. This model can be used to integrate and facilitate the organization and documentation of museum carpet information.
Safipour and Mollazadeh Nazem (2024)	Identifying and examining metadata standards in museums (with an emphasis on Iranian museums)	Documenting a museum artifact, as the most important and initial step in preserving a museum artifact, is the most essential step that adds to the knowledge about that object. Therefore, utilizing an integrated and comprehensive system for better access to museum object information in all museums is significant and essential. The purpose of this research is to identify and introduce the types of standards and patterns used in documenting museum artifacts, which shows the necessity and importance of creating and classifying metadata and museum artifact standards in museums. The results indicate the use of tested and globally approved standards that specify and classify metadata from different angles, and this will greatly help organize the documentation sector of museums in the country, in addition to standardizing the artifacts, it will also facilitate the accessibility of information.
Gavili Kilaneh et al. (2019)	Management of the organizational context metadata: a case study of the	The present study aimed to improve the management of the organizational metadata and the design of the metadata registry for the library complex of Shahid Beheshti University of Medical Sciences using analytical-a systematic approach. The research

	design and codification of the metadata schema registry for the libraries	findings indicate that the coherence and consistency in the creation and management of metadata are not at a desirable level for the description and organization of the content objects, as well as the consistency of metadata following the goals and local needs of the studied libraries. It seems that this inconsistency is due to some factors including the lack of clarity of all features and local needs of libraries (in general, the organizational context) and the lack of codified policies for metadata management, as well as the lack of precision in defining their native goals and functions from the perspective of metadata management.
Abam et al. (2015)	The application of metadata elements in organizing museum carpets	The study aimed to investigate the elements of museum metadata standards and their application in organizing museum carpets. The research findings showed that out of 818 elements of the 9 museum metadata standards studied, 250 elements are used in organizing museum carpets. These elements are considered in the form of 31 subgroups and two main descriptive and managerial groups for organizing and documenting museum carpet information.

Within the framework of a critical summary of the research background, it can be stated that despite various studies, no comprehensive model has been presented to describe and document the Iranian carpet, and the limited studies conducted have failed to accurately measure all components and identify the components of this model. Therefore, the attempt to describe and document the Iranian carpet, while integrating existing models, is considered an innovative aspect of this research. It is expected that by conducting this research while explaining and presenting the position and importance of describing and documenting the Iranian carpet in scientific and academic fields, an appropriate descriptive framework will be presented to the study community and its audience.

II. METHODOLOGY

What makes research on carpet metadata difficult is the lack of a standard database in the country that follows a specific metadata standard. Information gains value and credibility when it is made available to users in the cycle of use and becomes productive information, but since the volume of produced resources is increasing and the media on which this information is stored and maintained are changing and evolving rapidly, it is essential that this information is transferred to new media and also be equipped and documented based on a comprehensive metadata standard. In the present study, for data gathering, information review, interviews, questionnaires, and checklists have been used to examine and identify metadata standards to select appropriate elements for organizing and describing the carpet. The research community consisted of a diverse group of stakeholders, including carpet sellers, carpet buyers, information professionals, collectors, and elements, characteristics, and features of carpet metadata standards, which were selected through purposive sampling. The number of participants selected to conduct educational interviews consisted of 6 university professors and 9 practical experts and specialists.

III. RESULTS

After studying and examining the elements of the carpet metadata standards, out of the 209 elements in the carpet metadata standards, 149 elements were identified as suitable for organizing, documenting, and describing carpets. Subsequently, due to the large number of elements and the common meanings of some of them, some elements were combined and instead of them, one element was used that contains the meaning of the other elements. Then, to integrate and facilitate the use of the selected elements for organizing carpet information, and also considering that all the standards studied in the present study have divided their elements into different groups, all the elements proposed for organizing carpet information in the present study were divided into 11 subgroups in terms of semantics and application. Also, in the next stage, the elements were divided into two general groups of macro and micro factors. Each of these elements is listed in Table 2 along with the grouping of the elements.

Table 2: Elements and grouping of elements

Row	Categories		Name of elements
	Main group	Subgroup	
1	Micro factors	Title and type of carpet	Fine-woven carpet vs. coarse-woven carpet
2			Handmade carpet
3			Industrial carpet
4			Weaving effort
5		Artist or production company details	Weaver's gender
6			Weaver's age
7			Colleagues and the carpet weaving team
8			Weaver's skill
9			The artist's economic situation and livelihood
10			Carpet weaving technologies and techniques
11		Carpet condition and appearance description	Mass and industrial production
12			The overall condition of the artwork
13			Texture quality
14			Carpet weaving duration (date of start and completion of carpet weaving)
15			Original and fake
16			durability
17			artistic value
18			Carpet quality
19			Sharper edges
20			The number of Knot count in a carpet
21			clearer pattern
22			The length and width of the carpet pile
23			Unique effect
24			Special softness and shine
25			Carpet symmetry
26			The shine and flexibility of the carpet pile
27			New or second-hand
28		Color	Giving a feeling of warmth and vitality to the space
29			Color scheme
30			natural dyes
31			Industrial dyes
32			Colorfastness
33			Dyeing and color matching in natural light
34			Bleeding in carpets
35			Special and vibrant colors such as blue, red, green, and yellow
36			Unique color combination
37			Rich colors and attractive designs
38		Raw materials	Natural colors
39			Materials used in carpets such as silk, cotton, wool, and other fibers such as camel, goat or buffalo hair
40			Using natural yarns
41			Natural and valuable raw materials
42			High-quality wool
43		Industrial fibers	

44	Weaving style and technique	Shapes and geometry of designs and straight lines in carpets	
45		The presence of Corner and Medallion	
46		Delicate and intricate designs	
47		More details and subtlety of design	
48		Carpet grinding, weft weaving and polishing	
49		Looseness of the warp throughout the entire length of the weave	
50		Fine texture	
51		Using heavy combs to beat the weft	
52		Weaving speed	
53		Controlling skew and shrinkage at the edges of the carpet	
54		Carpet pattern	
55		Carpet weaving methods	
56		Advantages of the texture method	
57		The effort, time, and materials required to weave a carpet	
58		Creating precise, handmade details and patterns	
59		Elegant designs, patterns, and drawings by skilled designers	
60		Historical and geographical factors	Historical value and records
61			Texture standards in each region
62			Drawing inspiration from historical periods, especially their architecture
63	Geographical conditions		
64	Contemporary handmade carpets		
65	The history of carpet weaving		
66	Antique Persian carpet		
67	The beginning of classic carpet weaving		
68	Urban, rural, and nomadic carpets		
69	The largest weaving centers		
70	Cultural factors		High historical and cultural value
71		Spiritual value and preservation of the country's cultural heritage	
72		Use of national, religious, and cultural symbols	
73		Source of Inspiration for Carpet Weaving	
74		Carpet weaving - love in the form of art	
75		Culture and environment of carpet design and weaving	
76		Religious beliefs	
77		Handmade carpet, a symbol of the Iranian nation	
78		Interests in carpet weavers and designers	
79		Impact on environmental decoration	
80		Supporting dreams and aspirations	
81		Carpets represent the country's dignity and pride.	
82		The role of an animal with a human face	
83		Symbolism and Semiotics in Iranian Carpets	
84	Physical and mental health	The effect of carpet on physical health	
85		The dangers of carpet fibers, especially for diseases such as asthma	

86			Carpet fiber allergies for children
87			Mental and emotional peace
88			Reasons for enjoyment in life
89			Static electricity from handmade carpets
90			Carpet fame
91			The relationship between art and industry
92			Carpet export competitiveness and presence in global markets
93			Expansion of non-oil exports and government policymaking
94		Marketing and economics	Index of comparative advantage of countries in the production and export of hand-woven carpets
95			Carpet weaving training
96			Purchase conditions
97			Export destinations
98			Carpet fans
99			Product and seller credibility
100			Where to store a carpet
101			Insurance
102		Legal regulations and the risks of maintaining	Dangers threatening carpets such as fire
103			Periodic care and proper maintenance
104			Government and legal support for this industry
105			Material and moral rights

IV. DISCUSSION

This study was conducted to identify the necessary fields for introducing and describing carpets in a metadata scheme. This study, using a descriptive-analytical method and using sources, documents, and interviews, answered the question of which of the elements in metadata standards are suitable for organizing and documenting carpets. Transfer and access to information at the national and international levels require the organization and integration of information in an appropriate manner, and without the appropriate and optimal organization of information, complete and accurate information retrieval cannot be achieved. In this study, a mixed approach was used that includes current metadata writings and schemes and qualitative interviews. Existing metadata standards, such as Dublin Core, VRA Core, and other standards related to textiles and decorative arts, can provide good guidance for defining carpet metadata. The qualitative part included interviews with a diverse group of stakeholders including carpet sellers, carpet buyers, information professionals, and collectors.

The results showed that out of 209 elements in the carpet metadata standards, 149 elements suitable for organizing, documenting, and describing carpets were identified. Subsequently, due to the large number of elements and common meanings of some of them, some elements were combined and an element that contains the meaning of other elements was used instead. Then, to integrate and facilitate the use of selected elements to organize carpet information and also considering that all the standards studied in the present study divided their elements into different groups. Metadata is structured information that describes and provides other methods to facilitate the retrieval, use, or management of other resources. All the proposed elements for organizing carpet information in terms of semantics and usage were divided into 11 subgroups including Title and Type of Carpet, Artist or Production Company Details, Carpet Condition and Appearance Description, Color, Raw Materials, Weaving Style and Technique, Historical and Geographical Factors, Cultural Factors, Physical and Mental Health, Marketing and Economics, Legal Regulations and The Risks of Maintaining. Also, in the next stage, the elements were divided into two general groups of macro and micro factors. Similar to the research of Abam et al. (2015), in this study, carpets were considered as documents (objects) containing valuable information. Also, similar to the research conducted by Pandey and Kumar (2023), Weller et al. (2024), and Safipour and Mollazadeh Nazem (2024) which studied and examined metadata standards related to a specific information object, in this research,

metadata standards related to the carpet as an information object were also studied and examined. Similar to the findings of the research of White et al. (2024) and Karimi et al. (2024), based on the effectiveness of each metadata standard in organizing a specific object, the findings of the present study also showed that metadata standards, especially Dublin Core, can be a suitable answer for organizing information related to carpets. The elements presented in the present study, concerning the use of metadata, can play an effective role in organizing carpet information, facilitating the storage of this information, helping to access and retrieve accurate information in the field of carpets, determining the accuracy of carpet information and facilitating the dissemination of this information, creating a suitable environment for conducting research related to carpets, enabling communication and exchange of information between various experts active in the field of describing Iranian carpets. On the other hand, grouping the proposed elements into 11 subgroups and 2 main groups has a great impact and importance in integrating and organizing carpet information and facilitating access and management of carpet-related information. Based on the research results, the following practical suggestions are presented.

Development of metadata standards

It is recommended that up-to-date metadata standards be developed that are appropriate to the new needs of technology and information and appropriate to the carpet industry. These standards should be designed in such a way that they can be easily adapted to different types of data and information sources.

User training and empowerment

Holding workshops and training courses for librarians, researchers, and general users on the use of metadata and its standards in describing objects (carpets), especially in digital environments, can help improve the quality of information retrieval.

Interdisciplinary research

Encouraging researchers to conduct interdisciplinary research on carpets and metadata, especially about art, history, and anthropology, can contribute to the scientific and cultural richness of this field.

Creating shared databases: It is suggested that shared databases be created to collect and share information about carpets and related metadata. These databases can help researchers and enthusiasts access reliable and comprehensive sources.

Cultural Impact Analysis

Investigating and analyzing the cultural and social impacts of carpets in different societies can help to better understand the role of carpets as a communication and cultural medium. These analyses can lead to the identification of common patterns and differences in the use of carpets in different cultures. Also, in the design and implementation of metadata, attention to cultural and local diversity can help to increase the efficiency and acceptance of these systems in different societies, which should be considered.

Use of new technologies

Using new technologies such as artificial intelligence and machine learning to improve metadata search and retrieval processes can help increase efficiency and accuracy in this field.

Developing inter-agency collaborations

Establishing inter-agency collaborations between libraries, archives, and educational institutions can help exchange experiences and best practices in the field of metadata and information management.

Documenting and disseminating findings

Documenting and disseminating research findings in the field of metadata and carpets in the form of scientific articles, books, or technical reports can help expand knowledge and awareness in this field, and these suggestions can help improve metadata management and increase the quality of research in the field of carpets and related cultures.

Finally, it is suggested that future research examine new challenges and opportunities in the field of metadata and its impacts on information management in the digital world.

It is also recommended to use the suggested elements and examine the elements presented in this research for documentation and designing standards for organizing and documenting other woven objects.

Conducting extensive and in-depth research on metadata items and comparing the structure and characteristics of each of them, examining metadata items in the fields of carpet archives, examining the needs of digital resource databases in Iran to select or localize metadata items, researching how to implement metadata patterns in digital resource databases, and examining the reasons for not using metadata patterns in digital resource databases in Iran are among the suggestions for future research in the present study.

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